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Exhibit C

GAO

United States Government Accountability Office
Applied Research and Methods



GAO COST ESTIMATING AND ASSESSMENT GUIDE

Best Practices for Developing and Managing Capital Program Costs

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PREFACE

The U.S. Government Accountability Office is responsible for, among other things, assisting the Congress in its oversight of the federal government, including agencies' stewardship of public funds. To use public funds effectively, the government must meet the demands of today's changing world by employing effective management practices and processes, including the measurement of government program performance. In addition, legislators, government officials, and the public want to know whether government programs are achieving their goals and what their costs are. To make those evaluations, reliable cost information is required and federal standards have been issued for the cost accounting that is needed to prepare that information.¹ We developed the Cost Guide in order to establish a consistent methodology that is based on best practices and that can be used across the federal government for developing, managing, and evaluating capital program cost estimates.

For the purposes of this guide, a cost estimate is the summation of individual cost elements, using established methods and valid data, to estimate the future costs of a program, based on what is known today.² The management of a cost estimate involves continually updating the estimate with actual data as they become available, revising the estimate to reflect changes, and analyzing differences between estimated and actual costs—for example, using data from a reliable earned value management (EVM) system.³

The ability to generate reliable cost estimates is a critical function, necessary to support the Office of Management and Budget's (OMB) capital programming process.⁴ Without this ability, agencies are at risk of experiencing cost overruns, missed deadlines, and performance shortfalls—all recurring problems that our program assessments too often reveal. Furthermore, cost increases often mean that the government

¹Federal Accounting Standards Advisory Board, *Statement of Federal Financial Accounting Standards No. 4: Managerial Cost Accounting Standards and Concepts* (Washington, D.C.: July 1995).

²In the context of the Cost Guide, a program refers to all phases in a capital asset's life cycle—that is, concept analysis, technology definition, requirements planning, acquisition, and operations and maintenance.

³EVM is a project management tool that integrates the technical scope of work with schedule and cost elements for investment planning and control. It compares the value of work accomplished in a given period with the value of the work expected in that period. Differences in expectations are measured in both cost and schedule variances. The Office of Management and Budget (OMB) requires agencies to use EVM in their performance-based management systems for the parts of an investment in which development effort is required or system improvements are under way.

⁴Office of Management and Budget, *Preparation, Submission, and Execution of the Budget*, Circular No. A-11 (Washington, D.C.: Executive Office of the President, June 2006); *Management of Federal Information Resources*, Circular No. A-130 Revised (Washington, D.C.: Executive Office of the President, Nov. 28, 2000); and *Capital Programming Guide: Supplement to Circular A-11, Part 7, Preparation, Submission, and Execution of the Budget* (Washington, D.C.: Executive Office of the President, June 2006). www.whitehouse.gov/omb/circulars/index.html.

Step	Description	Associated task	Chapter
6	Obtain data	<ul style="list-style-type: none"> ▪ Create a data collection plan with emphasis on collecting current and relevant technical, programmatic, cost, and risk data; ▪ Investigate possible data sources; ▪ Collect data and normalize them for cost accounting, inflation, learning, and quantity adjustments; ▪ Analyze the data for cost drivers, trends, and outliers and compare results against rules of thumb and standard factors derived from historical data; ▪ Interview data sources and document all pertinent information, including an assessment of data reliability and accuracy; ▪ Store data for future estimates 	10
7	Develop point estimate and compare it to an independent cost estimate	<ul style="list-style-type: none"> ▪ Develop the cost model, estimating each WBS element, using the best methodology from the data collected,^a and including all estimating assumptions; ▪ Express costs in constant year dollars; ▪ Time-phase the results by spreading costs in the years they are expected to occur, based on the program schedule; ▪ Sum the WBS elements to develop the overall point estimate; ▪ Validate the estimate by looking for errors like double counting and omitted costs; ▪ Compare estimate against the independent cost estimate and examine where and why there are differences; ▪ Perform cross-checks on cost drivers to see if results are similar; ▪ Update the model as more data become available or as changes occur and compare results against previous estimates 	11, 12, and 15
8	Conduct sensitivity analysis	<ul style="list-style-type: none"> ▪ Test the sensitivity of cost elements to changes in estimating input values and key assumptions; ▪ Identify effects on the overall estimate of changing the program schedule or quantities; ▪ Determine which assumptions are key cost drivers and which cost elements are affected most by changes 	13
9	Conduct risk and uncertainty analysis	<ul style="list-style-type: none"> ▪ Determine and discuss with technical experts the level of cost, schedule, and technical risk associated with each WBS element; ▪ Analyze each risk for its severity and probability; ▪ Develop minimum, most likely, and maximum ranges for each risk element; ▪ Determine type of risk distributions and reason for their use; ▪ Ensure that risks are correlated; ▪ Use an acceptable statistical analysis method (e.g., Monte Carlo simulation) to develop a confidence interval around the point estimate; ▪ Identify the confidence level of the point estimate; ▪ Identify the amount of contingency funding and add this to the point estimate to determine the risk-adjusted cost estimate; ▪ Recommend that the project or program office develop a risk management plan to track and mitigate risks 	14